

Appln No. 10/627,725
Amdt date October 8, 2010
Reply to Office action of July 13, 2010

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Please amend claims 11, 17, 38, 39 and 41; and cancel claim 18.

1 - 10. (Canceled)

11. (Currently Amended) A method of preparing a positive active material for a rechargeable lithium battery comprising:

coating at least one lithiated compound with an organic solution of coating material source, the organic solution excluding water and prepared by adding a coating material source to an organic solvent forming a mixture, to produce a coated lithiated compound; and

drying the coated lithiated compound at a temperature between 60°C and 100°C to form a surface treatment layer on the coated lithiated compound without heat-treating the dried coated lithiated compound, thereby preparing the positive active material,

wherein the surface treatment layer includes ~~a coating element included a coating element included in a hydroxide, oxyhydroxide, oxycarbonate, hydroxycarbonate or a mixture thereof,~~

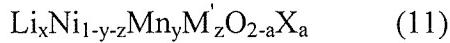
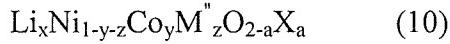
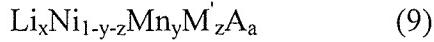
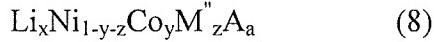
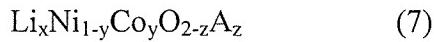
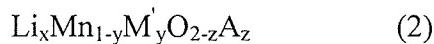
wherein when the surface treatment layer includes the coating element included in the oxyhydroxide, oxycarbonate, hydroxycarbonate or the mixture thereof, the coating element is selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof,

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wherein when the surface treatment layer includes the coating element included in the hydroxide, the coating element is selected from the group consisting of Mg, Al, Co, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof, and

wherein the at least one lithiated compound is prepared by mixing a lithium source, a metal source, and a solvent and the mixture is heat-treated twice.

12. (Original) The method of claim 11 wherein the lithiated compound is at least one lithiated compound represented by formulas 1 to 11,



where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq a \leq 2,$$

M is Ni or Co,

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M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

M" is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

13. (Previously Presented) The method of claim 11 wherein the coating material source is selected from the group consisting of a coating element, a coating element included-alkoxide, salt and oxide.

14. (Previously Presented) The method of claim 11 wherein the mixture is refluxed to form the organic solution of coating material source.

15 - 16. (Canceled)

17. (Currently Amended) The method of claim 11 wherein the organic solution of coating material source is formed from [[a]]the coating element in a form that is soluble in the organic solvents.

18. (Canceled)

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19. (Previously Presented) The method of claim 11 wherein the concentration of coating material source in the organic solution is 0.1 to 50 percent by weight.

20. (Previously Presented) The method of claim 19 wherein the concentration of coating material source in the organic solution is 5 to 30 percent by weight.

21. (Canceled)

22. (Previously Presented) The method of claim 11, wherein the coating of the at least one lithiated compound further comprises injecting blowing gas into a mixer.

23. (Previously Presented) The method of claim 11, wherein the coating of the at least one lithiated compound is performed under a vacuum.

24. (Previously Presented) The method of claim 11 further comprising sieving the dried coated compound.

25 - 37. (Canceled)

38. (Currently Amended) A method of preparing a positive active material including a core and a surface-treatment layer, for a rechargeable lithium battery, the method comprising:
coating the core including at least one lithiated compound, with an organic solution of coating material source, the organic solution excluding water and prepared by adding a coating material source to an organic solvent to form a mixture; and

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drying the coated core at a temperature between 60°C and 100°C to form the surface treatment layer on the core without heat-treating the core, thereby preparing the positive active material,

wherein the surface treatment layer includes ~~a coating element included a coating element included in a~~ hydroxide, oxyhydroxide, oxycarbonate, hydroxycarbonate or a mixture thereof,

wherein when the surface treatment layer includes the coating element included in the oxyhydroxide, oxycarbonate, hydroxycarbonate or the mixture thereof, the coating element is selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof,

wherein when the surface treatment layer includes the coating element included in the hydroxide, the coating element is selected from the group consisting of Mg, Al, Co, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof,

wherein the coating and drying of the lithiated compound is performed by injecting the lithiated compound and the organic solution into a mixer and continuously increasing the temperature within the mixer, and

wherein the at least one lithiated compound is prepared by mixing a lithium source, a metal source, and a solvent and the mixture is heat-treated twice.

39. (Currently Amended) A method of preparing a positive active material for a rechargeable lithium battery comprising:

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coating a core having at least one lithiated compound with an organic solution of coating material source, the organic solution excluding water and prepared by adding a coating material source to an organic solvent to form a mixture; and

drying the core at a temperature between 60°C and 100° C to form [[the]]a surface treatment layer on the core without heat-treating the core, thereby preparing the positive active material,

wherein the surface treatment layer includes ~~a-eating element included-a coating element included in a~~ hydroxide, oxyhydroxide, oxycarbonate, hydroxycarbonate or a mixture thereof,

wherein when the surface treatment layer includes the coating element included in the oxyhydroxide, oxycarbonate, hydroxycarbonate or the mixture thereof, the coating element is selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof,

wherein when the surface treatment layer includes the coating element included in the hydroxide, the coating element is selected from the group consisting of Mg, Al, Co, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof, and

wherein the at least one lithiated compound is prepared by mixing a lithium source, a metal source, and a solvent and the mixture is heat-treated twice.

40. (Canceled)

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41. (Currently Amended) A method of preparing a positive active material for a rechargeable lithium battery comprising:

coating at least one lithiated compound having an average diameter of $10\mu\text{m}$ with an organic solution of coating material source, the organic solution excluding water and prepared by adding a coating material source to an organic solvent to form a mixture and to produce a coated lithiated compound; and

drying the coated lithiated compound at a temperature between 60°C and 100°C to form a surface treatment layer on the coated lithiated compound without heat-treating the dried coated lithiated compound, thereby preparing the positive active material,

wherein the surface treatment layer includes a coating element included a coating element included in a hydroxide, oxyhydroxide, oxycarbonate, hydroxycarbonate or a mixture thereof,

wherein when the surface treatment layer includes the coating element included in the oxyhydroxide, oxycarbonate, hydroxycarbonate or the mixture thereof, the coating element is selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof.

wherein when the surface treatment layer includes the coating element included in the hydroxide, the coating element is selected from the group consisting of Mg, Al, Co, Ca, Si, Ti, Sn, B, Ge, Ga, B, As, Zr, and a mixture thereof, and

wherein the at least one lithiated compound is prepared by mixing a lithium source, a metal source, and a solvent and the mixture is heat-treated twice.